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I. Considerations on the Change of the Latitudes
of some of the principal fixt Stars. By Edmund
Halley, R. S. Sec.

Having of late had occasion to examine the quantity of the Precession of the Equinoctial Points, I took the pains to compare the Declinations of the fixt Stars delivered by *Ptolemy*, in the 3d Chapter of the 7th Book of his *Almag.* as observed by *Timocharis* and *Aristyllus* near 300 Years before Christ, and by *Hipparchus* about 170 Years after them, that is about 130 Years before Christ, with what we now find: and by the result of very many Calculations, I concluded that the fixt Stars in 1800 Years were advanced somewhat more than 25 degrees in Longitude, or that the Precession is somewhat more than 50" per ann. But that with so much uncertainty, by reason of the imperfect Observations of the Ancients, that I have chosen in my Tables to adhere to the even proportion of five Minutes in six Years, which from other Principles we are assured is very near the Truth. But while I was upon this Enquiry, I was surprized to find the Latitudes of three of the principal Stars in Heaven directly to contradict the supposed-greater Obliquity of the Ecliptick, which seems confirmed by the Latitudes of most of the rest: they being set down in the old Catalogue, as if the Plain of the Earths Orb had changed its Situation, among the fixt Stars, about 20' since the time of *Hipparchus*. Particularly all the Stars in *Gemini* are put down. those to the Northward of the Ecliptick, with so much less Latitude than we find, and those to the Southward with so much more Southerly Latit-

Latitude. Yet the three Stars *Palilicium* or the *Bulls Eye*, *Sirius* and *Arcturus* do contradict this Rule directly: for by it, *Palilicium* being in the days of *Hipparchus* in about 10 gr. of *Taurus* ought to be about 15 Min. more *Southerly* than at present, and *Sirius* being then in about 15 of *Gemini* ought to be 20 Min. more *Southerly* than now; yet è contra *Ptolomy* places the first 20 Min. and the other 22 more *Northly* in Latitude than we now find them. Nor are these errors of Transcription, but are proved to be right by the declinations of them set down by *Ptolomy*, as observed by *Timocharis*, *Hipparchus* and himself, which shew that those Latitudes are the same as those Authors intended. As to *Arcturus*, he is too near the Equinoctial Colure, to argue from him concerning the change of the Obliquity of the Ecliptick, but *Ptolomy* gives him 33' more North Latitude than he now has; and that greater Latitude is likewise confirmed by the Declinations delivered by the abovesaid Observers. So then all these three Stars are found to be above half a degree more *Southerly* at this time than the Antients reckoned them. When on the contrary at the same time the bright Shoulder of *Orion* has in *Ptolomy* almost a degree more *Southerly* Latitude than at present. What shall we say then? it is scarce credible that the Antients could be deceived in so plain a matter, three Observers confirming each other. Again these Stars being the most conspicuous in Heaven, are in all probability the nearest to the Earth, and if they have any particular Motion of their own, it is most likely to be perceived in them, which in so long a time as 1800 Years may shew it self by the alteration of their places, though it be utterly imperceptible in the space of a single Century of Years. Yet as to *Sirius* it may be observed that *Tycho Brabe* makes him 2 Min. more *Northly* than we now find him, whereas he ought to be above as much

much more *Somberly* from his Ecliptick, (whose Obliquity he makes $2\frac{1}{2}$ greater than we esteem it at present) differing in the whole $4\frac{1}{2}$ Min. One half of this difference may perhaps be excused, if refraction were not allowed in this Case by *Tycho*; yet two Minutes, in such a Star as *Sirius*, is somewhat too much for him to be mistaken.

But a further and more evident proof of this change is drawn from the Observation of the application of the Moon to *Palilicium Anno Christi 509 Mart. 11°.* when in the beginning of the Night the Moon was seen to follow that Star very near, and seemed to have Eclipsed it. ἐπέβαλλε γάρ οὐαστο τῷ σώζει τὸ διχολογίαν μέρει τῆς νύκτος παραφερεται τῷ τετράτομενοι μέρει. i. e. Stella apposita erat parti per quam riscabatur limbus Lune illuminatus, as *Bullialdus*, to whom we are beholden for this Antient Observation has translated it. Now from the undoubted principles of Astronomy, it was impossible for this to be true at *Athens*, or near it, unless the Latitude of *Palilicium* were much less than we at this time find it. *Vide Bullialdi Astr. Philolaica, pag. 172.*

This Argument seems not unworthy of the Royal Society's Consideration, to whom I humbly offer the plain Fact as I find it, and would be glad to have their Opinion.

But whether it were really true, that the Obliquity of the Ecliptick was, in the time of *Hipparchus* and *Ptolemy*, really 22 Min. greater than now, may well be questioned; since *Pappus Alexandrinus*, who lived but about 200 Years after *Ptolemy*, makes it the very same that we do. *Vide Pappi Collect. Lib. VI. Prop. 35.*